

We claim:

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1. A method for defining a computer implemented factory automation lifecycle, the method comprising:
    - a) Defining, installing and administrating lifecycle activity framework components;
    - b) defining factory modeling lifecycle activity framework components; and
    - c) defining manufacturing controlling, monitoring and tracking lifecycle activity framework components.
  2. The method of claim 1, wherein defining administrating lifecycle activity framework components comprises defining one or more framework components selected from the group consisting of a security component, a GUI console component, a performance and license management component and a saga management component.
  3. The method of claim 1, wherein defining factory modeling lifecycle activity framework components comprises defining one or more framework components selected from the group consisting of a context resolution component, a configuration management component and a calendar component.
  4. The method of claim 1, wherein defining manufacturing controlling, monitoring and tracking lifecycle activity framework components comprises defining one or more framework components selected from the group consisting of a visual workflow component, a resource coordination component, an event monitor component and a bill of resources component.
  5. The method of claim 1 additionally comprising a method for defining one or more analyzing of manufacturing results lifecycle activity framework components.

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6. The method of claim 5, wherein defining one or more analyzing of manufacturing results lifecycle activity framework components comprises defining a data manager component.
- 5 7. The method of claim 5 additionally defining a method for defining interactions between the one or more manufacturing results lifecycle activity framework components and components selected from the group consisting of factory modeling lifecycle activity framework components.
- 10 8. The method of claim 1 additionally defining a SW developing and integrating lifecycle activity.
9. The method of claim 1 additionally defining a manufacturing planning lifecycle activity.
- 15 10. The method of claim 1 wherein defining a factory automation lifecycle comprises defining a factory automation lifecycle for processing an integrated circuit structure.
- 20 11. The method of claim 1, wherein defining a factory automation life-cycle additionally comprises defining framework components such that the framework components are adapted for communicating with a tool integration component, wherein the framework components are selected from the group consisting of installing and administrating lifecycle activity framework components, factory modeling lifecycle activity framework components, and manufacturing controlling, monitoring and tracking lifecycle activity framework components.
- 25 12. The method of claim 11 wherein defining manufacturing controlling, monitoring and tracking lifecycle activity components comprises defining a visual workflow component.
- 30 13. A method for managing a processing system including one or more computers,

the method comprising:

- a) running a factory automation lifecycle including one or more framework software components by means of the one or more computers;
- b) running one or more application software components to provide one or more computer implemented instructions for managing the system, wherein the one or more framework components are adapted for managing the application components;
- c) determining whether the one or more instructions need to be modified;
- d) communicating the one or more instructions to the system, if the instructions do not need to be modified;
- e) modifying the instructions if they need to be modified, by means of the one or more framework components thereby forming modified instructions; and
- f) communicating the modified instructions to the system.

14. The method of claim 13 additionally comprising managing the processing system by executing the one or more instructions in the system.

15. The method of claim 13 wherein running one or more of the framework components comprises running one or more components selected from the group consisting of a security component, a GUI console component, a performance and license management component, a saga management component, a context resolution component, a configuration management component, a calendar component, a visual workflow component, a resource coordination component, an event monitor component, a bill of resources component and a data manager component.

16. The method of claim 13 wherein running one or more application components comprises running one or more components selected from the group consisting of a quality management component, a tool integration component, an equipment management component, a recipe management component, a dispatching and scheduling component, a material handling component, a work in progress component and a legacy system interface component.

17. The method of claim 13 wherein communicating comprises communicating by means of a tool integration component.
18. The method of claim 17 wherein communicating comprises communicating by means of:
- a) a tool interface program; and
  - b) a tool integration component adapter.
19. The method of claim 17 wherein the one or more computer implemented instructions are visual framework component instructions.
20. The method of claim 13, additionally comprising forming one or more framework components by means of one or more software building blocks selected from the group consisting of a server construction building block, a persistence building block, a common GUI controls building block, a publish and subscribe messaging building block, a dynamic API discovery building block, an associations building block, a history building block, a generic service executor building block, a classifications building block, a customer defined attributes building block, a state models building block, a namespace building block, a schedule/datebook building block, a templates building block, a versioned objects building block and a navigation building block.
21. The method of claim 13 wherein running one or more framework components additionally comprises communicating a data structure of the one or more framework component to a data structure of the one or more components selected from the group consisting of framework components and application components.
22. The method of claim 13, wherein modifying the instructions comprises inputting data.
23. The method of claim 13 wherein managing a processing system comprises

managing a system for processing an integrated circuit structure.

24. The method of claim 23 wherein the system comprises one or more wafer fabrication tools.

(25) A method for linking a software framework to an apparatus, the method comprising linking by means of a tool integration component including:

- a) a tool interface program; and
- b) a tool integration component adapter.

26. The method of claim 25 wherein linking comprises exchanging messages between:

- the one or more framework components;
- the tool integration component adapter; and
- the tool interface program.

27. The method of claim 26 wherein the one or more framework components comprise a visual workflow component.

(28) A method for processing a product, the method comprising:

- a) determining specifications for processing the product; and
- b) managing the processing by means of a distributed factory system framework including: (1) a factory automated lifecycle having one or more framework components and (2) one or more application components wherein the framework components are adapted for managing the application components.

29. The method of claim 28 wherein managing additionally comprises:

- a) determining whether the distributed factory system framework needs to be modified in order to meet the specifications; and
- b) modifying one or more of the application components if the distributed factory system framework needs to be modified.

30. The method of claim 29 wherein modifying comprises inputting data.

31. The method of claim 28 wherein managing additionally comprises forming one or more framework components by means of one or more software building blocks.

32. The method of claim 28 wherein managing additionally comprises:

- a) forming one or more computer implemented instructions for managing, by means of the one or more application components;
- b) communicating the one or more instructions to equipment for processing the product; and
- c) executing the one or more instructions on the equipment.

33. The method of claim 32 wherein communicating comprises communicating by means of a tool integration component, wherein the tool integration component comprises: (1) a tool integration component adapter and (2) a tool interface program.

34. The method of claim 28 wherein processing a product comprises processing an integrated circuit structure.

35. A method for starting a wafer fab run, the method comprising:

- a) determining a sequence of processing steps for processing the wafer fab run;
- b) forming a workflow defining the sequence, in a visual workflow component which is included in a distributed factory system framework having: (1) framework components and (2) application components; and
- c) requesting the visual workflow component to start the run by means of a service which is a work in progress management component or a GUI within a GUI console component.

36. An apparatus for processing a product, the apparatus comprising:

- a) product processing equipment;

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- b) at least one central processing unit for electronic data processing;
  - c) a link for operably linking the central processing unit to the product processing equipment;
  - d) a memory for storing digitally coded data structures, wherein the memory is operably linked to the at least one central processing unit; and
  - e) a digitally coded first data structure stored in the memory wherein the data structure comprises a factory automation lifecycle including: (1) administrating lifecycle activity framework components, (2) factory modeling lifecycle activity framework components, and (3) manufacturing controlling and tracking lifecycle activity framework components.
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37. The apparatus of claim 36, wherein the administrating lifecycle activity framework components comprise one or more framework components selected from the group consisting of a security component, a GUI console component, a performance and license management component and a saga management component.

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38. The apparatus of claim 36, wherein the factory modeling lifecycle activity framework components comprise one or more framework components selected from the group consisting of a context resolution component, a configuration management component and a calendar component.

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39. The apparatus of claim 36, wherein the manufacturing controlling and tracking lifecycle activity framework components comprise one or more framework components selected from the group consisting of a visual workflow component, a resource coordination component, an event monitor component and a bill of resources component.

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40. The apparatus of claim 36 additionally comprising one or more analyzing of manufacturing results lifecycle activity framework components.

41. The apparatus of claim 40, wherein the one or more analyzing of manufacturing results lifecycle activity framework components comprise a data

manager component.

42. The apparatus of claim 36 additionally comprising a digitally coded second data structure including application components, wherein the first data structure is adapted for managing the second data structure.

43. The apparatus of claim 42 additionally comprising a digitally coded third data structure including software building blocks for forming one or more of the framework components.

44. The apparatus of claim 36, wherein the first data structure comprises:

- a) a digitally coded fourth data structure including a GUI console component; and
- b) a digitally coded fifth data structure including a configuration management component.

45. The apparatus of claim 44, wherein the fourth and fifth data structures are adapted for interacting.

46. The apparatus of claim 36 wherein the link comprises a tool integration component including: (1) a tool integration component adapter and (2) a tool interface program

47. The apparatus of claim 36 comprising an apparatus for processing an integrated circuit structure.

48. An apparatus for processing a product, the apparatus comprising:

- a) product processing equipment;
- b) at least one central processing unit for electronic data processing;
- c) a link for operably linking the central processing unit to the product processing equipment;
- d) a memory for storing digitally coded data structures, wherein the memory is operably linked to the at least one central processing unit; and

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- 5 e) a distributed factory system framework for managing the product processing, the distributed factory system framework comprising: (1) a digitally coded first data structure comprising a factory automation lifecycle including digitally coded framework components, (2) a digitally coded second data structure comprising application components adapted for communicating digitally coded instructions to the processing equipment, wherein the first data structure is adapted for managing the second data structure and (3) a link for communicating the digitally coded instructions to the processing equipment.

10 49. The apparatus of claim 48 comprising an apparatus for processing an integrated circuit structure.

15 50. A distributed factory system framework for managing a processing system, the distributed factory system framework comprising:

- 20 a) a digitally coded first data structure comprising digitally coded framework components;  
b) a digitally coded second data structure comprising application components adapted for communicating digitally coded instructions to the processing system, wherein the first data structure is adapted for managing the second data structure; and  
c) a link for communicating the digitally coded instructions to the processing system.

25 51. The distributed factory system framework of claim 50 wherein the framework components comprise one or more components selected from the group consisting of a security component, a GUI console component, a performance and license management component, a saga management component, a context resolution component, a configuration management component, a calendar component, a visual workflow component, a resource coordination component, an event monitor component, a bill of resources component and a data manager component.

30 52. The distributed factory system framework of claim 50 wherein the application components comprise one or more components selected from the group consisting

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of a quality management component, a tool integration component, an equipment management component, a recipe management component, a dispatching and scheduling component, a material handling component, a work in progress component and a legacy system interface component.

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53. The distributed factory system framework of claim 50 wherein the link comprises a fourth data structure including a tool integration component.

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54. The distributed factory system framework of claim 53 wherein the fourth data structure comprises:

- a) a tool interface program fifth data structure; and
- b) a tool integration component adapter sixth data structure.

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55. The distributed factory system framework of claim 50, additionally comprising one or more software building blocks selected from the group consisting of a server construction building block, a persistence building block, a common GUI controls building block, a publish and subscribe messaging building block, a dynamic API discovery building block, an associations building block, a history building block, a generic service executor building block, a classifications building block, a customer defined attributes building block, a state models building block, a namespace building block, a schedule/datebook building block, a templates building block, a versioned objects building block and a navigation building block.

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56. A data storage device comprising a digitally coded first data structure including a factory automation lifecycle having:

- a) administrating lifecycle activity framework components;
- b) factory modeling lifecycle activity framework components; and
- c) manufacturing controlling and tracking lifecycle activity framework components.

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57. The device of claim 56, wherein the administrating lifecycle activity framework components comprise one or more framework components selected from the group consisting of a security component, a GUI console component, a

performance and license management component and a saga management component.

5 58. The device of claim 56, wherein the factory modeling lifecycle activity framework components comprise one or more framework components selected from the group consisting of a context resolution component, a configuration management component and a calendar component.

10 59. The device of claim 56, wherein the manufacturing controlling and tracking lifecycle activity framework components comprise one or more framework components selected from the group consisting of a visual workflow component, a resource coordination component, an event monitor component and a bill of resources component.

15 60. The device of claim 56 additionally comprising one or more analyzing of manufacturing results lifecycle activity framework components.

20 61. The device of claim 60, wherein the one or more analyzing of manufacturing results lifecycle activity framework components comprise a data manager component.

53 62. The device of claim 56 comprising a plurality of framework components which are adapted for interacting with a GUI console framework component.

25 63. The device of claim 56 additionally comprising a digitally coded second data structure including application components, wherein the first data structure is adapted for managing the second data structure.

30 64. The device of claim 63 additionally comprising a digitally coded third data structure including software building blocks for forming one or more of the framework components.

65. The device of claim 64 wherein the first, second and third data structures are

adapted for processing an integrated circuit structure.

66. A data storage device comprising:

- a) a digitally coded first data structure comprising a factory automation lifecycle including digitally coded framework components; and
- b) a digitally coded second data structure comprising application components, wherein the first data structure is adapted for modifying the second data structure

67. The device of claim 66 wherein the framework components comprise one or more components selected from the group consisting of a security component, a GUI console component, a performance and license management component, a saga management component, a context resolution component, a configuration management component, a calendar component, a visual workflow component, a resource coordination component, an event monitor component, a bill of resources component and a data manager component.

68. The device of claim 66 wherein the application components comprise one or more components selected from the group consisting of a quality management component, a tool integration component, an equipment management component, a recipe management component, a dispatching and scheduling component, a material handling component, a work in progress component and a legacy system interface component.

69. The device of claim 66 additionally comprising a digitally coded third data structure including one or more software building blocks selected from the group consisting of a server construction building block, a persistence building block, a common GUI controls building block, a publish and subscribe messaging building block, a dynamic API discovery building block, an associations building block, a history building block, a generic service executor building block, a classifications building block, a customer defined attributes building block, a state models building block, a namespace building block, a schedule/datebook building block, a templates building block, a versioned objects building block and a navigation

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building block.

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**DISCUSSION**